REMARKS

Claims 29 - 52 are pending. Claims 1, 3 - 11, 13 - 18, and 21, 24, 27, and 28 have been cancelled. Claims 29 - 52 have been added. No new matter has been introduced. Reexamination and reconsideration of this application are respectfully requested.

In the February 3, 2004 Office Action, the Examiner rejected claims 1, 3-11, 13-18, and 21, 24, 27, and 28 under 35 U.S.C. §103(a) as being anticipated by U.S. Patent No. 6,363,160 to Bradski et al. ("the Bradski reference"), in view of a combination of U.S. Patent No. 6,181,817 to Zabih et al. ("the Zabih reference"), U.S. Patent No. 5,016,173 to Kenet et al. ("the Kenet reference"), and U.S. Patent No. 6,188,777 to Darnell et al. ("the Darnell reference"). These rejections are respectfully traversed in so far as applicable to the presently pending claims.

Independent claim 29 recites:

> A method of calibrating a computer-vision system to track a selected object through a series of frames of data, comprising:
> displaying an image frame from an image input device, said image frame including a calibration rectangle;
> converting the image frame from a red-green-blue pixel information to a hue saturation value (HSV) array of pixels;
> thresholding the HSV array of pixels to create a thresholded HSV array of pixels;
> establishing an initial test window location in the thresholded HSV array of pixels to create an initial test HSV array of pixels;
> **determining a mean saturation of initial test HSV array of pixels;**
> **determining if the mean saturation of the initial test HSV array of pixels falls within a first predetermined range;**
> **determining if a standard deviation of saturation of the initial test HSV array of pixels is less than a first predetermined amount, if the mean saturation of initial HSV array of pixels falls within predetermined range;**
> **determine a mean hue of initial test HSV array of pixels if the standard deviation of the saturation of the initial test HSV array of**

pixels falls within the first predetermined range; and
determining a standard deviation of hue of the initial test HSV array of pixels, if the mean hue of the initial test HSV array of pixels falls within a second predetermined range.

The Bradski reference does not disclose, teach, or suggest the method of claim 29. The Examiner states that the Bradski reference discloses the restarting of the calibration method if the mean hue or the standard deviation is less than a predetermined level. *(Office Action, page 9).* The applicants respectfully disagree with the Examiner. Starting at column 4, line 60 of the Bradski patent until the end of the Bradski patent, the Bradski reference is disclosing the locating of the center of an object (that is to be tracked) and the ability to track the object. The Bradski patent, in column 4, lines 1 - 57, discloses the creating of a flesh hue probability histogram. In the flesh hue probability histogram, pixel hues that are likely to be flesh hues are given high percentage values and pixel hues that are not likely to be given flesh hues are given low probability values. *(Bradski, col. 4, lines 40 - 45).* In other words, the creating of the flesh hue probability histogram of the Bradski patent is described in columns 3 and 4, and the rest of the Bradski patent describes the tracking of the object. There is no discussion of determining a mean or standard deviation of saturation or hues of specific parts of the image. Claim 29 is directed to the calibration of an image. After the image is calibrated, a probability distribution is created which forms a pixel classification map. Although, the process for locating the center of an object and the tracking of an object are described in the present invention specification, the claims of the present invention are directed to the calibration of a system and the creation of the pixel classification map.

Unlike the method of claim 29, the Bradski reference does not disclose, teach, or

suggest 1) **determining a mean saturation of an initial test HSV array of pixels and 2) determining if a standard deviation of the saturation of the initial test HSV array of pixels is less than a first predetermined amount, if the mean saturation of the initial test HSV array of pixels falls within a first predetermined range.** The Examiner states that the Bradski reference discloses calculating a mean saturation and a standard deviation of a saturation of the pixels. (*Office Action, page 9).* The applicants have investigated each of the Examiner's cited locations in the Bradski patent and do not find that the Bradski reference discloses these highlighted limitations. Instead, the Bradski reference discloses that after pixels in the video image have been converted into the HSV color space, the pixels are added to the flesh hue histogram if the corresponding saturation and value values are greater than predetermined thresholds. Then, after all the pixels have been thresholded, the flesh hue histogram is normalized so that the maximum value of the histogram is equal to the probability value of 1. *(Bradski, col. 4, lines 10 - 38).* The thresholding described in the Bradski reference is similar to the thresholding disclosed in the thresholding limitation of independent claim 29. This is not the same as determining a mean saturation of the pixels or a standard deviation of the pixels because the Bradski reference is only determining whether or not the saturation value of the Bradski image is greater than a threshold value.

Further, the Bradski reference does not disclose 1) **determining a mean hue of initial test HSV array of pixels, if the standard deviation of the saturation of the initial test HSV array of pixels is less than a first predetermined amount; and 2) determining a standard deviation of hue of the initial test HSV array of pixels if**

the mean hue of the initial test HSV array of pixels falls within a second predetermined range. The Examiner states that the Bradski discloses the claimed limitation of calculating a mean hue and a standard deviation of a hue of pixels because the mean hue and standard deviation of hue values are inherently associated with hue probability density. *(Office Action, page 9)*. While the mean hue and standard deviation of the hue may be associated with the hue probability density, this is not the same as determining the mean hue for a array of pixels and determining a standard deviation of the of the hues of the initial HSV array of pixels. It is not the same because the Bradski reference never discloses that the mean hue and the standard deviation of the hue are calculated or determined. Instead, the Bradski reference discloses that the mean location of a search window in the hue probability distribution is utilized to move the location of the search window. This is not the same as determining a mean hue or determining a standard deviation of the hue in an initial test HSV array of pixels. Accordingly, applicants respectfully submit that claim 29 distinguishes over the Bradski reference.

The Zabih reference, the Kenet reference, and the Darrell reference do not make up for the deficiencies of the Bradski reference. The Examiner utilizes the Darrell reference in view of the Zabih reference and the Kenet reference to teach the selecting of an object based on the lower sum of a hue standard deviation and a saturation standard deviations. *(Office Action, page 9)*. Assuming, *arguendo*, that the Darrell reference, the Zabih reference, and the Kenet reference teach all that the Examiner states that they do, the Darell, Zabih, and Kenet references does not disclose, teach, or suggest any of the highlighted limitations of claim 29. Accordingly, applicants

respectfully submit that claim 29 distinguishes over the Darrell reference / Zabih reference / Kenet reference / Bradski reference combination.

Independent claim 41 recites similar limitations to independent claim 29. Accordingly, applicants respectfully submit that independent claim 41 distinguishes over the Bradski, Darrell, Zabih, and Kenet references, alone or in combination, for similar reasons as discussed above in regard to claim 29.

Claims 30 - 40 and 42 - 52 depend, directly or indirectly on independent claims 29 and 41. Accordingly, applicants respectfully submit that claims 30 - 40 and 42 - 52 distinguish over the Bradski, Darell, Zabih, and Kenet references, alone or in combination for the same reasons as discussed above in regard to independent claims 29 and 41.

Dependent claims 30 - 33 further distinguish over the cited references. The Examiner in rejecting claim 1, which included similar test window limitations, states that adjacent test windows are described as having a same shape and pixel size. *(Office Action, page 3)*. Specifically, the Bradski reference discloses that an initial search window size and an initial search window location are selected. Then, a mean location of the search window is located at step 530. At step 540, the center of the search window is moved onto the mean location that was computed in step 530. At step 550, it is determined whether the center of the probability distribution is converged upon. *(Bradski, col. 5, lines 1 - 11)*.

The disclosure of the Bradski search window is unlike the limitations of claims 30 - 33, wherein a new test window is utilized **if the mean hue or the mean saturation fall outside a predetermined range** or where a new test window is utilized if the **hue**

standard deviation or the saturation standard deviation is less than a predetermined value. It is not the same because the Bradski reference is calculating the mean location of the probability distribution within the search window and is not looking at **means or standard deviations of hues or saturations of the pixels** in a test window. Accordingly, applicants respectfully submit that claims 30 - 33 further distinguish over the Bradski reference. The Examiner does not utilize the Darell, Zabih, and Kenet references to disclose the use of test windows. Accordingly, applicants respectfully submit that dependent claims 30 - 33 further distinguish over the Bradski / Darrell / Zabih / Kenet reference combination.

Claims 42 - 45 recite similar limitations to claims 30 - 33. Accordingly, applicants respectfully submit that claims 42 - 45 distinguish over the cited references for similar reasons as discussed above in regard to claims 30 - 33.

Claims 34 and 35 further distinguish over the cited references. Claims 34 and 35 recite:

> 34. The method of claim 29, further including **determining if a sum of the standard deviation of hue and the standard deviation of saturation of the initial test HSV array of pixels is less than a sum of a standard deviation of hue and a standard deviation of saturation for current pixel data stored in a memory**.
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> 35. The method of claim 34, further including **storing the initial test HSV array of pixels as the current pixel data if the standard deviation of hue and the standard deviation of saturation for the initial test HSV array of pixels is less than the sum of the standard deviation of hue and the standard deviation of saturation for the current pixel data stored in the memory and discarding the current pixel stored in memory.**

The Examiner states that the Bradski reference is silent on the claim limitation "lowest sum of a hue standard deviation and a saturation standard deviation.

Applicants agree and respectfully submit that claims 34 and 35 distinguish over the Bradski reference.

The Examiner states that the Darrell reference in view of the Zabih reference and the Kenet reference discloses selecting an object based on the lowest sum of a hue standard deviation and a saturation standard deviation. Further, the Examiner states that the Darrell reference teaches selecting a tracking object based on the optimum ranges and the highest probability density for a search region by collecting the variance data of joint probability distributions for the observed color data, while the Zabih reference teaches selecting a best match result (with the optimum ranges and the highest probability density) for an object based on the color joint histograms of the candidate images and based on the calculation of the standard deviations (variance) for each color in the color in HSV color space, while the Kenet reference teaches finding a search region based on the optimum ranges /criteria by optimization and joint histograms. *(Office Action, page 4).* The Applicants understand the Examiner's utilization of the references. However, none of the Darrell, Zabih, or Kenet references disclose the highlighted limitations.

Instead, the Zabih reference discloses dividing the image into five overlapping regions and computing moments of the color distributions in each image. The mean of a distribution is derived from the first moment, the variance and the standard deviation from the second moment, etc. The moments are computed for each color channel in the HSV colorspace, where pixels close to the border have less weight. The difference between two regions is a weighted sum of the differences in each of the three moments. *(Zabih, column 2, lines 20 - 37).* The Kenet reference discloses calculating

a mean and standard deviation, but does not disclose the adding of the means or standard deviations. *(Kenet, column 20, lines 10 - 30)*. The Darrell reference disclosure discloses gathering variance data of joint probability distributions and does not mention adding a mean and a standard deviation of an initial test group of pixels. None of these references disclose the **adding of a standard deviation and a mean of an initial test array of pixels and comparing this to a sum of a standard deviation and a mean of stored current pixel data**. Nor is there a disclosure that **if the sum for the initial test array of pixels is less than the sum for the current pixel data, the initial test array of pixels is stored as the current pixel data**. According, applicants respectfully submit that claims 34 and 35 distinguish over the Bradski / Darrell / Zabih / Kenet reference combination.

Claims 46 and 47 recite similar limitations to claims 34 and 35. Accordingly, applicants respectfully submit that claims 46 and 47 further distinguish over the cited references for the same reasons as discussed above in regard to claims 34 and 35.

Claims 36 and 37 further distinguish over the cited references. Claims 36 and 37 are directed to utilizing of new test windows and repeating the steps of claim 29 for each of the new test windows. The Bradski reference discloses the use of an iterative process to select a search window size and location, and then to create a flesh hue probability distribution for that search window. A calculation region is determined and then a new flesh hue probability distribution is calculated for that area. The method continues to search for the area with the greatest probability density. *(Bradski, col. 7, lines 22 - 55)*. The Bradski reference, however, is not disclosing **the determining of the mean saturation, the standard deviation of the saturation, the mean hue, or**

the standard deviation of the hue for each next test group of pixels. Instead, it selects a new search window, thresholds the data in the search window, and creates a new flesh probability histogram. There is no disclosure that the **any mean or standard deviation calculations are made for this new search window**. Accordingly, claims 36 and 37 further distinguish over the Bradski reference.

Claims 48 and 49 recite similar limitations to claims 36 and 37. Accordingly, applicants respectfully submit that claims 48 and 49 further distinguish over the Bradski reference for the similar reasons as discussed above in regard to claims 36 and 37.

Claims 38 - 40 further distinguish over the cited references. Claims 38 - 40 are directed to the combination of the current pixel data for a frame with pixel data stored for other frames. After the pixel data has been combined, the method determines if the new combined pixel data has standard deviations of hue and saturation less than predetermined amounts. The Bradski reference does not disclose the use of analyzing standard deviations of hue and saturation from **multiple frames of data**. Accordingly, applicants respectfully submit that claims 38 - 40 distinguish over the Bradski reference.

Claims 50 - 52 recite similar limitations to claims 38 - 40. Accordingly, applicants respectfully submit that claims 50 - 52 further distinguish over the Bradski reference.

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Applicants believe that the foregoing amendments place the application in condition for allowance, and a favorable action is respectfully requested. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call either of the undersigned attorneys at the Los Angeles telephone number (213) 488-7100 to discuss the steps necessary for placing the application in condition for allowance should the Examiner believe that such a telephone conference would advance prosecution of the application.

Respectfully submitted,

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